AWQ-LGD
SAWQ-LGD

70-SDP-04-78C
M/R files
NOV 2004

FOX engineering

November 26, 2003

Ms. Nina Koger, Lead Engineer
Energy & Waste Management Bureau
Iowa Department of Natural Resources
502 East 9th Street
Des Moines, Iowa 50319

Con 12-1-1
Doc # 32985

RE: 2003 Annual Groundwater Quality Report
City of Muscatine C&D Landfill
70-SDP-4-78C
P.N. 6008

Ms. Koger:

Find attached 1 copy of the 2003 Annual Groundwater Quality Report for the City of Muscatine C&D Landfill.

A copy of this data has been forwarded to Mr. Lavene Payne, Solid Waste Manager and Field Office #6 as required by the Permit.

Sincerely,
FOX ENGINEERING ASSOCIATES, INC.

Todd Whipple, CPG
Project Manager

Water | Wastewater | Solid Waste | Air | Land

1601 Golden Aspen Dr.
Suite 103
Ames, Iowa 50010
1.515.233.0000
1.800.433.3469
Fax 1.515.233.0103
www.foxeng.com
info@foxeng.com

70-SDP-04-78C

Need better S/L map
this one does not have Scale or North arrow

can't do

2003 ANNUAL GROUNDWATER QUALITY REPORT

FOR THE

MUSCATINE C&D LANDFILL

by:
FOX Engineering, Inc.
1601 Golden Aspen Drive, Suite 103
Ames, Iowa 50010
(515) 233-0000

FOX engineering

6008-03B.320

ANNUAL GROUNDWATER QUALITY REPORT

November 14, 2003

Ms. Nina Koger, Lead Engineer
IDNR - Solid Waste Section
Wallace State Office Building
900 E. Grand Ave.
Des Moines, Iowa 50319

RE: Muscatine C&D Landfill
CLOSURE PERMIT # 70-SDP-4-78C
FOX PN 6008-03B.320

Dear Ms. Koger:

This Annual Groundwater Quality Report has been prepared in accordance with IAC 567-113.26(8).

ANNUAL REPORT

1. **Effects on Surface Water:** Surface water at the site is controlled by vegetation and City street infrastructure. There are no surface water points being sampled at the present time.

2. **Effects on Groundwater:** A summary of analytical data for each monitoring well in the HMSP and the Analytical Reports for the past year are included as Attachment A. A summary of the statistical computations for the upgradient Water Table Well (MW-6) is included in the Concentration versus Time spreadsheets in Attachment B. The concentrations of the various compounds detected in each well are graphed over time versus the statistical limits calculated in the upgradient wells. The graphs are included in the spreadsheets in Attachment B.

   The monitoring system includes monitoring wells intersecting the water table surface within glacial tills. The effects to the groundwater are discussed below.

   Monitoring wells comprising the Hydrologic Monitoring System Plan (HMSP) include MW 6 (upgradient) and MW 2; 3, 4, and 7 (downgradient). Analytical results from upgradient monitoring well MW-6 indicate historically detected concentrations of chloride, COD, iron, nitrogen ammonia, phenol, and TOX. The presence of the compounds in the upgradient well suggest that the compounds are endemic to the region, or, conversely, that a upgradient source of the compounds exists.

   Detected concentrations in all monitoring wells are below the Primary Drinking Water MCL. Each of the downgradient wells MW-2, MW-3, MW-4, and MW-7 exhibit compound concentrations in excess of the Secondary Drinking Water MCL for iron. Similarly, the chloride concentration at MW-3 exceeded the Secondary Drinking Water MCL in January, 1996; April, 1998; and October, 1998.

Those compounds that exceed the calculated statistical limit, but not the MCL are summarized by well as follows:

MW-2 - TOX (10/96), phenol (10/98 & 10/00).
MW-3 - iron, chloride, nitrogen ammonia (7/93), COD (10/96), TOX (10/96), phenol (10/96).
MW-4 - chloride (4/96, 4/97 & 4/98), COD (10/99), TOX (10/96 & 10/98), phenols(10/98).
MW-7 - iron (10/98), TOX (10/96), phenol (10/98)

Due to the presence of detectable concentrations of each of the listed compounds in the upgradient well, the elevated levels in the downgradient wells listed above are not interpreted as an indication of a leachate release into groundwater.

The detection of a compound above statistical limits during a single episode or during isolated episodes are not interpreted to represent a persistent leachate release. The interpretation is made that detection above the statistical limits during a single event, or during isolated episodes represents anomalous conditions in the well, the site conditions, or in the sampling activities.

Each parameter will continue to be routinely sampled and evaluated in accordance with the Special Provisions of the Permit.

3. **Monitoring Well Maintenance and Performance Evaluation:** A Monitoring Well Performance Evaluation Report dated April, 1999 was prepared and submitted in accordance with IAC 567-113.21. The report concluded that the integrity of all MW's was intact, and that no changes in the HMSP were recommended. Monitoring well reevaluation is tentatively scheduled for April, 2004, and should again include all monitoring wells included in HMSP.

Review of the water elevation data for 2003 does not indicate excessive variability compared to historic water elevation data. Water elevation data is summarized in Attachment C. Based on the available water elevation data, the assessment of well conditions, and the hydrologic conditions at the site, the semi-annual water level measurements are interpreted to be sufficient to gauge notable changes in the site hydrology.

Flow paths are illustrated on the Groundwater Contour Map included in Attachment D.

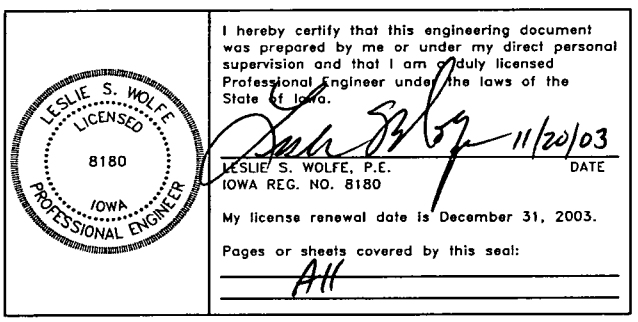
4. **Leachate Control Plan:** This landfill is currently exempt from providing and implementing a leachate control system plan as per the Closure Permit. The conditional exemption is common in many Closure Permits at sites that were closed prior to installation of leachate collection systems (i.e. Lucas-Monroe Landfill, Ames Landfill, and Marshall County Area A Landfill, etc.).

Based on the current condition of the site, we do not anticipate that IDNR will require any additional actions or rescind the Leachate Control Exemption. Our recent semi-annual Engineering's inspections have not revealed leachate seeps at the site.

5. **Explosive Gas Monitoring:** Explosive gas monitoring ceased at the site in 1998 based on authorization by IDNR in Provision 2, Permit Amendment #1, dated September 15, 1998 (Attachment E).

6. **Recommendations:**

a. Continue routine monitoring of the HMSP monitoring wells and re-evaluate as part of the 2004 Annual Groundwater Quality Report due November 30, 2004.
b. Continue water elevation measurements on a semi-annual basis.
c. Continue Engineer's inspections on a semi-annual basis.
d. Continue to monitor the integrity of the landfill cap.



ATTACHMENT A
Analytical Results & Summary Tables

CITY OF MUSCATINE C&D LANDFILL
70-SDP-4-78C
MONITORING WELL SAMPLING RESULTS

		SAMPLING DATE:		09/04/2003		
		D.G.W	D.G.W	D.G.W	U.G.W	U.G.W
PARAMETER	MCL	MW 2	MW 3	MW 4	MW 6	MW 7
ug/L						
Benzene *	5	NT	NT	NT	NT	NT
Carbon tetrachloride *	5	NT	NT	NT	NT	NT
1,4-Dichlorobenzene *	0.6	NT	NT	NT	NT	NT
1,2-Dichloroethane *	5	NT	NT	NT	NT	NT
1,1-Dichloroethylene *	7	NT	NT	NT	NT	NT
1,1,1-Trichloroethane *	200	NT	NT	NT	NT	NT
Vinyl Chloride	2	NT	NT	NT	NT	NT
cis-1,2-Dichloroethylene	70	NT	NT	NT	NT	NT
Tetrachloroethylene *	5	NT	NT	NT	NT	NT
Trichloroethylene *	5	NT	NT	NT	NT	NT
mg/L						
Arsenic, dissolved	0.05	NT	NT	NT	NT	NT
Barium, dissolved	2	NT	NT	NT	NT	NT
Cadmium, dissolved	0.005	NT	NT	NT	NT	NT
Chromium, dissolved	0.1	NT	NT	NT	NT	NT
Copper, dissolved	1.3	NT	NT	NT	NT	NT
Zinc, dissolved	5	NT	NT	NT	NT	NT
Lead, dissolved	0.015	NT	NT	NT	NT	NT
Mercury, dissolved	0.002	NT	NT	NT	NT	NT
Magnisium, dissolved	---	NT	NT	NT	NT	NT
Iron, dissolved	0.3	0.305	1.06	<0.3	<0.3	dry
Chloride	250	<10	108	42	86	dry
Nitrogen, Ammonia	---	1.4	1.2	<1.0	<1.0	dry
Chemical Oxygen Dema	---	<10	28	16	<10	dry
Phenols	---	<0.1	<0.1	<0.1	<0.1	dry
TOX	---	<0.01	0.018	0.014	<0.01	dry
pH	6.5-8.5	8.1	7.6	7.5	7.7	dry
Temperature, celsius	---	16	14	13	13	dry
Conductivity	---	600	1500	1050	950	dry

Keystone
LABORATORIES, INC.

ACCREDITED IN ACCORDANCE WITH nelac

MEMBER ACIL

Accreditations:
Iowa DNR: 095
New Jersey DEP: IA001
Kansas DHE: E-10287

ANALYTICAL REPORT

September 22, 2003

Work Order: 13I0274

Report To	Work Order Information
Todd Whipple Fox Engineering Associates, Inc. 1601 Golden Aspen Drive, Suite 103 Ames, IA 50010	Date Received: 09/05/2003 3:00PM Collector: Freeman, Richard Phone: 515-233-0000 PO Number:

Project: Landfill
Project Number: Muscatine C & D

Analyte	Result	MRL	Method	Analyst	Analyzed	Qualifier
13I0274-01 MW-2			Matrix:Water		Collected: 09/04/03 17:15	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	<10 mg/l	10	EPA 410.4	SAA	09/08/03 14:55	
Chloride	<10 mg/l	10	EPA 9252	SAA	09/09/03 8:40	
Nitrogen, Ammonia	**1.4 mg/l**	**1.0**	SM 4500-NH3 F	SAA	09/08/03 14:53	
Phenols, total	<0.100 mg/l	0.100	EPA 9065	KRV	09/08/03 15:57	
Total Organic Halogens (TOX)	<0.010 mg/l	0.010	EPA 9020	DES	09/15/03 0:00	
Determination of Dissolved Metals						
Iron, dissolved	**0.305 mg/l**	**0.030**	EPA 6010B	LAR	09/08/03 12:26	
13I0274-02 MW-3			Matrix:Water		Collected: 09/04/03 17:35	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	**28 mg/l**	**10**	EPA 410.4	SAA	09/08/03 14:55	
Chloride	**108 mg/l**	**10**	EPA 9252	SAA	09/09/03 8:40	
Nitrogen, Ammonia	**1.2 mg/l**	**1.0**	SM 4500-NH3 F	SAA	09/08/03 14:53	
Phenols, total	<0.100 mg/l	0.100	EPA 9065	KRV	09/08/03 15:57	
Total Organic Halogens (TOX)	**0.018 mg/l**	**0.010**	EPA 9020	DES	09/15/03 0:00	
Determination of Dissolved Metals						
Iron, dissolved	**1.06 mg/l**	**0.030**	EPA 6010B	LAR	09/08/03 12:26	
13I0274-03 MW-4			Matrix:Water		Collected: 09/04/03 17:50	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	**16 mg/l**	**10**	EPA 410.4	SAA	09/08/03 14:55	
Chloride	**42 mg/l**	**10**	EPA 9252	SAA	09/09/03 8:40	
Nitrogen, Ammonia	<1.0 mg/l	1.0	SM 4500-NH3 F	SAA	09/08/03 14:53	
Phenols, total	<0.100 mg/l	0.100	EPA 9065	KRV	09/08/03 15:57	
Total Organic Halogens (TOX)	**0.014 mg/l**	**0.010**	EPA 9020	DES	09/15/03 0:00	
Determination of Dissolved Metals						
Iron, dissolved	<0.030 mg/l	0.030	EPA 6010B	LAR	09/08/03 12:26	
13I0274-04 MW-6			Matrix:Water		Collected: 09/04/03 18:10	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Samples were preserved in accordance with 40 CFR for pH adjustment unless otherwise noted. MRL= Method Reporting Limit.

Keystone
LABORATORIES, INC.

ACCREDITED IN ACCORDANCE WITH nelac

MEMBER ACIL

Fox Engineering Associates, Inc.
1601 Golden Aspen Drive, Suite 103
Ames, IA 50010

September 22, 2003

Work Order: 13I0274

Analyte	Result	MRL	Method	Analyst	Analyzed	Qualifier
13I0274-04 MW-6			Matrix:Water		Collected: 09/04/03 18:10	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	<10 mg/l	10	EPA 410.4	SAA	09/08/03 14:55	
Chloride	**86 mg/l**	**10**	EPA 9252	SAA	09/09/03 8:40	
Nitrogen, Ammonia	<1.0 mg/l	1.0	SM 4500-NH3 F	SAA	09/08/03 14:53	
Phenols, total	<0.100 mg/l	0.100	EPA 9065	KRV	09/08/03 15:57	
Total Organic Halogens (TOX)	<0.010 mg/l	0.010	EPA 9020	DES	09/15/03 0:00	
Determination of Dissolved Metals						
Iron, dissolved	<0.030 mg/l	0.030	EPA 6010B	LAR	09/08/03 12:26	

End of Report

Jeffrey King

Keystone Laboratories, Inc.
Jeffrey King, Ph.D.
Laboratory Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Samples were preserved in accordance with 40 CFR for pH adjustment unless otherwise noted. MRL= Method Reporting Limit.

CHAIN OF CUSTODY RECORD

Keystone LABORATORIES, INC.

☐ 600 E. 17th St. S.
Newton, IA 50208
Phone: 641-792-8451
Fax: 641-792-7989

☐ 3012 Ansborough Ave.
Waterloo, IA 50701
Phone: 319-235-4440
Fax: 319-235-2480

☐ 1304 Adams
Kansas City, KS 66103
Phone: 913-321-7856
Fax: 913-321-7937

PAGE 1 OF 1

PRINT OR TYPE INFORMATION BELOW

SAMPLER: Richard Freeman
SITE NAME: 9908 93 B95 0 City of Muscatine C & D
ADDRESS:
CITY/ST/ZIP:
PHONE:

REPORT TO:
NAME: Todd Whipple
COMPANY NAME: Fox Engr
ADDRESS:
CITY/ST/ZIP: Ames
PHONE: Ref 515-290-6693
FAX:

BILL TO:
NAME: MR Laurene Payne, Solid Waste
COMPANY NAME: Muscatine Recycling & Transfer Station
ADDRESS: 1000 Hauser St
CITY/ST/ZIP: Muscatine, IA 52761
PHONE:

Keystone Quote No.: (If Applicable)

CLIENT SAMPLE NUMBER	DATE	TIME	SAMPLE LOCATION	NO. OF CONTAINERS	MATRIX	GRAB/COMPOSITE	ANALYSES REQUIRED: 10"	ANALYSES REQUIRED: 4"	LAB USE ONLY: SAMPLE CONDITION/COMMENTS	LAB USE ONLY: LABORATORY SAMPLE NUMBER
MW 2	9/4/03	515Pm	Monitoring Well 2	5	W	X	X	X		01
MW 3		535Pm	3				X	X		02
MW 4		550Pm	4				X	X		03
MW 6		610Pm	6				X	X		04

LABORATORY WORK ORDER NO.: 13I0274

SAMPLE TEMPERATURE UPON RECEIPT: °C

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Turn-Around:
				☑ Standard ☐ Rush (Contact Lab Prior to Submission)
Relinquished by: (Signature)	Date / Time	Received for Lab by: (Signature)	Date 9-5-03 Time 3:00	Remarks: Metals Filtered Samples Cold

Original - Return with Report Yellow - Lab Copy Pink - Sampler Copy FORM COC 7-97

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-2 Upgradient ____
Downgradient ✓

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 640.86 Ground Elevation 638.70
Depth of Well 42.16 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	9/4/03	8.4	
*After Purging		27.0	
*Before Sampling	9/4/03 5:15pm	8.6	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 10
No.of Well Volumes (based on current water level) 2
Was well pumped/bailed dry? —

Equipment used:
Bailer type PVC 'Dedicated Bailer ____
Pump type ____ 'Dedicated Bailer ____
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions P. Cloudy 60-80°
Field Measurments (after stabilization):
Temperature 16 Units ____
Equipment Used HACH COMPANY POCKET PAL
pH 8.1
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 600 Units ____
Equipment Used HACH COMPANY POCKET PAL

Comments ____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-3 Upgradient _____
Downgradient ✓

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 640.36 Ground Elevation 638.30
Depth of Well 22.06 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	9/4/03	11.8	
*After Purging		19.0	
*Before Sampling	9/4/03 5:35pm	12.0	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 6
No.of Well Volumes (based on current water level) 3
Was well pumped/bailed dry? No

Equipment used:
Bailer type PVC 'Dedicated Bailer
Pump type 'Dedicated Bailer
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions P.CLOUDY 60° - 80°
Field Measurments (after stabilization):
Temperature 14 Units
Equipment Used HACH COMPANY POCKET PAL
pH 7.6
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 1500 Units
Equipment Used HACH COMPANY POCKET PAL

Comments

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-4 Upgradient _____
Downgradient V

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 693.22 Ground Elevation 691.29
Depth of Well 24.93 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	9/4/03	20.1	
*After Purging		23.0	
*Before Sampling	9/4/03 5:50pm	20.0	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 1.5
No.of Well Volumes (based on current water level) 2
Was well pumped/bailed dry? dry

Equipment used:
Bailer type PVC 'Dedicated Bailer _____
Pump type _____ 'Dedicated Bailer _____
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions P.cloudy (60°-80°
Field Measurments (after stabilization):
Temperature 13 Units _____
Equipment Used HACH COMPANY POCKET PAL
pH 7.5
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 1050 Units _____
Equipment Used HACH COMPANY POCKET PAL

Comments _____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-6 Upgradient ✓
Downgradient

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 716.63 Ground Elevation 714.65
Depth of Well 48.98 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	9/4/03	43.55	
*After Purging		48.0	
*Before Sampling	9/4/03 6:10pm	46.40	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 1 gal
No.of Well Volumes (based on current water level) 1 Vol
Was well pumped/bailed dry? dry

Equipment used:
Bailer type PVC *Dedicated Bailer
Pump type *Dedicated Bailer
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions P.cloudy 60°-80°
Field Measurments (after stabilization):
Temperature 13 Units
Equipment Used HACH COMPANY POCKET PAL
pH 7.7
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 950 Units
Equipment Used HACH COMPANY POCKET PAL

Comments

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-7 Upgradient ✓
Downgradient

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 716.65 Ground Elevation 714.90
Depth of Well 22.25 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	9/4/03	21.95	
*After Purging			
*Before Sampling	too dry to sample		

C.) WELL PURGING

Quantity of Water Removed from Well (gallons)
No.of Well Volumes (based on current water level)
Was well pumped/bailed dry?

Equipment used:
Bailer type PVC 'Dedicated Bailer
Pump type 'Dedicated Bailer
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions P.CLOUDY 60°- 80°
Field Measurments (after stabilization):
Temperature Units
Equipment Used HACH COMPANY POCKET PAL
pH
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions Units
Equipment Used HACH COMPANY POCKET PAL

Comments

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

542-1322

CITY OF MUSCATINE C&D LANDFILL
70-SDP-4-78C
MONITORING WELL SAMPLING RESULTS

SAMPLING DATE: 03/13/03

PARAMETER	MCL	D.G.W MW 2	D.G.W MW 3	D.G.W MW 4	U.G.W MW 6	U.G.W MW 7
ug/L						
Benzene *	5	NT	NT	NT	NT	NT
Carbon tetrachloride *	5	NT	NT	NT	NT	NT
1,4-Dichlorobenzene *	0.6	NT	NT	NT	NT	NT
1,2-Dichloroethane *	5	NT	NT	NT	NT	NT
1,1-Dichloroethylene *	7	NT	NT	NT	NT	NT
1,1,1-Trichloroethane *	200	NT	NT	NT	NT	NT
Vinyl Chloride	2	NT	NT	NT	NT	NT
cis-1,2-Dichloroethylen	70	NT	NT	NT	NT	NT
Tetrachloroethylene *	5	NT	NT	NT	NT	NT
Trichloroethylene *	5	NT	NT	NT	NT	NT
mg/L						
Arsenic, dissolved	0.05	NT	NT	NT	NT	NT
Barium, dissolved	2	NT	NT	NT	NT	NT
Cadmium, dissolved	0.005	NT	NT	NT	NT	NT
Chromium, dissolved	0.1	NT	NT	NT	NT	NT
Copper, dissolved	1.3	NT	NT	NT	NT	NT
Zinc, dissolved	5	NT	NT	NT	NT	NT
Lead, dissolved	0.015	NT	NT	NT	NT	NT
Mercury, dissolved	0.002	NT	NT	NT	NT	NT
Magnisium, dissolved	---	NT	NT	NT	NT	NT
Iron, dissolved	0.3	0.511	4.78	0.215	<0.3	dry
Chloride	250	<10	116	50	90	dry
Nitrogen, Ammonia	---	1.1	1.1	<1.0	<1.0	dry
Chemical Oxygen Dem	---	<10	20	12	<10	dry
Phenols	---	NT	NT	NT	NT	NT
TOX	---	NT	NT	NT	NT	NT
pH	6.5-8.5	7.7	7.7	7.9	8	dry
Temperature, celsius	---	11	11	12	12	dry
Conductivity	---	593	1518	1209	914	dry

Keystone
LABORATORIES, INC.

ACCREDITED IN ACCORDANCE WITH nelac

MEMBER ACIL

Accreditations:
Iowa DNR: 095
New Jersey DEP: IA001
Kansas DHE: E-10287

ANALYTICAL REPORT

May 02, 2003

Work Order: 13C0676

Report To	Work Order Information
Todd Whipple Fox Engineering Associates, Inc. 1601 Golden Aspen Drive, Suite 103 Ames, IA 50010	Date Received: 03/19/2003 11:40AM Collector: Freeman, Richard Phone: 515-233-0000 PO Number:

Project: Landfill
Project Number: Muscatine C & D

Analyte	Result	MRL	Method	Analyst	Analyzed	Qualifier
13C0676-01 MW-6			Matrix:Water		Collected: 03/18/03 18:00	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	<10 mg/l	10	EPA 410.4	MAQ	03/21/03 13:44	
Chloride	**90 mg/l**	**10**	EPA 9252	RVV	03/24/03 15:34	
Nitrogen, Ammonia	<1.0 mg/l	1.0	SM 4500-NH3 F	SAA	03/24/03 11:31	
Determination of Dissolved Metals						
Iron, dissolved	<0.030 mg/l	0.030	EPA 6010B	LAR	03/20/03 16:32	
13C0676-02 MW-2			Matrix:Water		Collected: 03/18/03 17:15	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	<10 mg/l	10	EPA 410.4	MAQ	03/21/03 13:44	
Chloride	<10 mg/l	10	EPA 9252	RVV	03/24/03 15:34	
Nitrogen, Ammonia	**1.1 mg/l**	**1.0**	SM 4500-NH3 F	SAA	03/24/03 11:31	
Determination of Dissolved Metals						
Iron, dissolved	**0.511 mg/l**	**0.030**	EPA 6010B	LAR	03/20/03 16:32	
13C0676-03 MW-3			Matrix:Water		Collected: 03/18/03 17:25	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	**20 mg/l**	**10**	EPA 410.4	MAQ	03/21/03 13:44	
Chloride	**116 mg/l**	**10**	EPA 9252	RVV	03/24/03 15:34	
Nitrogen, Ammonia	**1.1 mg/l**	**1.0**	SM 4500-NH3 F	SAA	03/24/03 11:31	
Determination of Dissolved Metals						
Iron, dissolved	**4.78 mg/l**	**0.030**	EPA 6010B	LAR	03/20/03 16:32	
13C0676-04 MW-4			Matrix:Water		Collected: 03/18/03 17:45	
Determination of Conventional Chemistry Parameters						
Chemical Oxygen Demand	**12 mg/l**	**10**	EPA 410.4	MAQ	03/21/03 13:44	
Chloride	**50 mg/l**	**10**	EPA 9252	RVV	03/24/03 15:34	
Nitrogen, Ammonia	<1.0 mg/l	1.0	SM 4500-NH3 F	SAA	03/24/03 11:31	
Determination of Dissolved Metals						
Iron, dissolved	**0.215 mg/l**	**0.030**	EPA 6010B	LAR	03/20/03 16:32	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Samples were preserved in accordance with 40 CFR for pH adjustment unless otherwise noted. MRL= Method Reporting Limit.

Fox Engineering Associates, Inc.
1601 Golden Aspen Drive, Suite 103
Ames, IA 50010

Work Order: 13C0676

End of Report

Ericka Weintz

Keystone Laboratories, Inc.
Ericka Weintz
Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Samples were preserved in accordance with 40 CFR for pH adjustment unless otherwise noted. MRL= Method Reporting Limit.

CHAIN OF CUSTODY RECORD

Keystone LABORATORIES, INC.

☐ 600 E. 17th St. S.
Newton, IA 50208
Phone: 641-792-8451
Fax: 641-792-7989

☐ 3012 Ansborough Ave.
Waterloo, IA 50701
Phone: 319-235-4440
Fax: 319-235-2480

☐ 1304 Adams
Kansas City, KS 66103
Phone: 913-321-7856
Fax: 913-321-7937

PAGE 1 OF 1

PRINT OR TYPE INFORMATION BELOW	REPORT TO:	BILL TO:
SAMPLER: [illegible]	NAME: [illegible]	NAME: [illegible]
SITE NAME: [illegible]	COMPANY NAME: [illegible]	COMPANY NAME: [illegible]
ADDRESS:	ADDRESS:	ADDRESS: [illegible]
CITY/ST/ZIP:	CITY/ST/ZIP: [illegible]	CITY/ST/ZIP: [illegible]
PHONE:	PHONE: [illegible]	PHONE:
	FAX:	Keystone Quote No.: (If Applicable)

CLIENT SAMPLE NUMBER	DATE	TIME	SAMPLE LOCATION	NO. OF CONTAINERS	MATRIX	GRAB/COMPOSITE	ANALYSES REQUIRED								SAMPLE CONDITION/COMMENTS	LABORATORY SAMPLE NUMBER
MW 6	3/18/03	[illegible]	[illegible] 6	3	W	[illegible]	X									
MW 2	"	[illegible]	" 2	"	"	"	X									
MW 3	"	[illegible]	" 3	"	"	"	X									
MW 4	"	[illegible]	" 4	"	"	"	X									

LAB USE ONLY
LABORATORY WORK ORDER NO.
SAMPLE TEMPERATURE UPON RECEIPT: °C

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Turn-Around:
[illegible signature]	Date 3/18/03 Time [illegible]		Date Time	☑ Standard ☐ Rush ____ Contact Lab Prior to Submission
Relinquished by: (Signature)	Date Time	Received for Lab by: (Signature) [illegible]	Date [illegible] Time [illegible]	Remarks: [illegible]

Origi[redacted] Return [redacted] Report [redacted] Yellow [redacted] Lab Copy [redacted] • [redacted] Pink [redacted] Sampler Copy [redacted] FORM: CCR 7.97

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY OF MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-2 Upgradient ____
Downgradient ✓

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 640.86 Ground Elevation 638.70
Depth of Well 42.16 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/18/03	7.15	
*After Purging		27.0	
*Before Sampling	3/18/03 5:15 pm	8.9	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 10
No.of Well Volumes (based on current water level) 2
Was well pumped/bailed dry? No

Equipment used:
Bailer type PVC *Dedicated Bailer ____
Pump type ____ *Dedicated Bailer ____
If not dedicated, method of cleaning Alconox + clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions CLOUDY 40° - 65°
Field Measurments (after stabilization):
Temperature 11 Units ____
Equipment Used HACH COMPANY POCKET PAL
pH 7.7
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 593 Units ____
Equipment Used HACH COMPANY POCKET PAL

Comments ____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-3 Upgradient _____
Downgradient ✓

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 640.36 Ground Elevation 638.30
Depth of Well 22.06 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/18/03	9.2	
*After Purging		16.0	
*Before Sampling	3/18/03 5:25pm	9.0	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 6
No.of Well Volumes (based on current water level) 3
Was well pumped/bailed dry? No

Equipment used:
Bailer type PVC 'Dedicated Bailer _____
Pump type _____ 'Dedicated Bailer _____
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions cloudy 40°-65°
Field Measurments (after stabilization):
Temperature 11 Units _____
Equipment Used HACH COMPANY POCKET PAL
pH 7.7
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 1518 Units _____
Equipment Used HACH COMPANY POCKET PAL

Comments _____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-4 Upgradient ____
Downgradient V

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 693.22 Ground Elevation 691.29
Depth of Well 24.93 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/18/03	19.08	
*After Purging		20.70	
*Before Sampling	3/18/03 5:45pm	19.10	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 3
No.of Well Volumes (based on current water level) 3
Was well pumped/bailed dry? No

Equipment used:
Bailer type PVC *Dedicated Bailer ____
Pump type ____ *Dedicated Bailer ____
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions cloudy 40° -65°
Field Measurments (after stabilization):
Temperature 12 Units ____
Equipment Used HACH COMPANY POCKET PAL
pH 7.92
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 1209 Units ____
Equipment Used HACH COMPANY POCKET PAL

Comments ____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

542-1322

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-6 Upgradient ✓
Downgradient

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 716.63 Ground Elevation 714.65
Depth of Well 48.98 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/18/03	42.55	
*After Purging		48.00	
*Before Sampling	3/18/03 6:00pm	42.60	

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) 1.5
No.of Well Volumes (based on current water level) 1.0
Was well pumped/bailed dry? yes

Equipment used:
Bailer type PVC *Dedicated Bailer
Pump type *Dedicated Bailer
If not dedicated, method of cleaning Alconox & clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions Cloudy 40° - 65°
Field Measurments (after stabilization):
Temperature 12 Units
Equipment Used HACH COMPANY POCKET PAL
pH 8.0
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions 914 Units
Equipment Used HACH COMPANY POCKET PAL

Comments

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name CITY of MUSCATINE C&D Landfill Permit No. 70-SDP-4-78C

Monitoring Well/Piezometer No. MW-7 Upgradient ✓
Downgradient

Name of person sampling Richard Freeman

A.) MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? yes Standing Water or Litter? No
If no, explain — If yes, explain —

B.) GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Elevation: Top of inner well casing 716.65 Ground Elevation 714.90
Depth of Well 22.25 Inside Casing Diameter (in inches) 2.0"
Equipment Used SOLINST

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	3/18/03	~~[illegible]~~ 21.15	
*After Purging		too dry to sample	
*Before Sampling			

C.) WELL PURGING

Quantity of Water Removed from Well (gallons) —
No.of Well Volumes (based on current water level) —
Was well pumped/bailed dry? —

Equipment used:
Bailer type PVC *Dedicated Bailer
Pump type *Dedicated Bailer
If not dedicated, method of cleaning Alconox + clean water rinse

D.) FIELD MEASUREMENT

Weather Conditions
Field Measurments (after stabilization):
Temperature — Units
Equipment Used HACH COMPANY POCKET PAL
pH —
Equipment Used HACH COMPANY POCKET PAL
Specific Conditions — Units
Equipment Used HACH COMPANY POCKET PAL

Comments

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

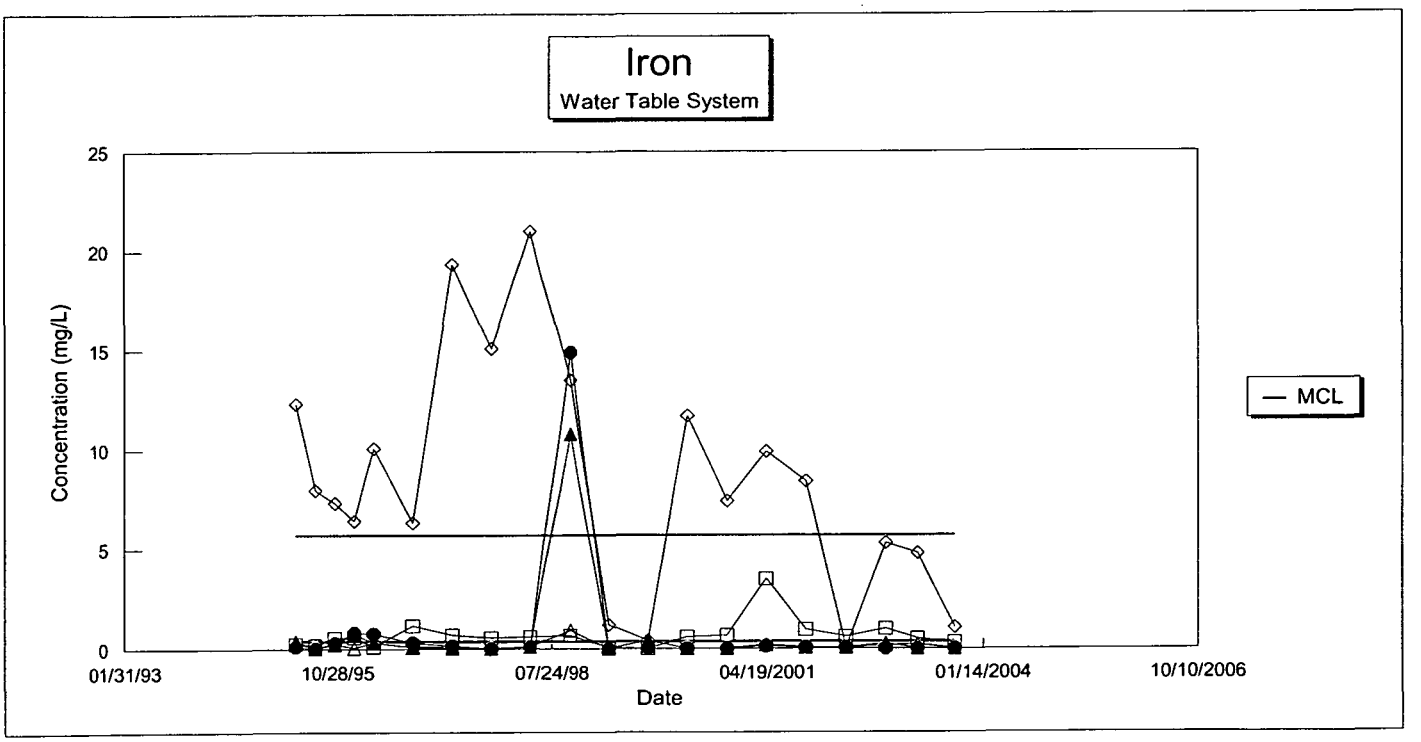
*Omit if only measuring groundwater elevations.

542-1322

ATTACHMENT B
Concentration versus Time Graphs

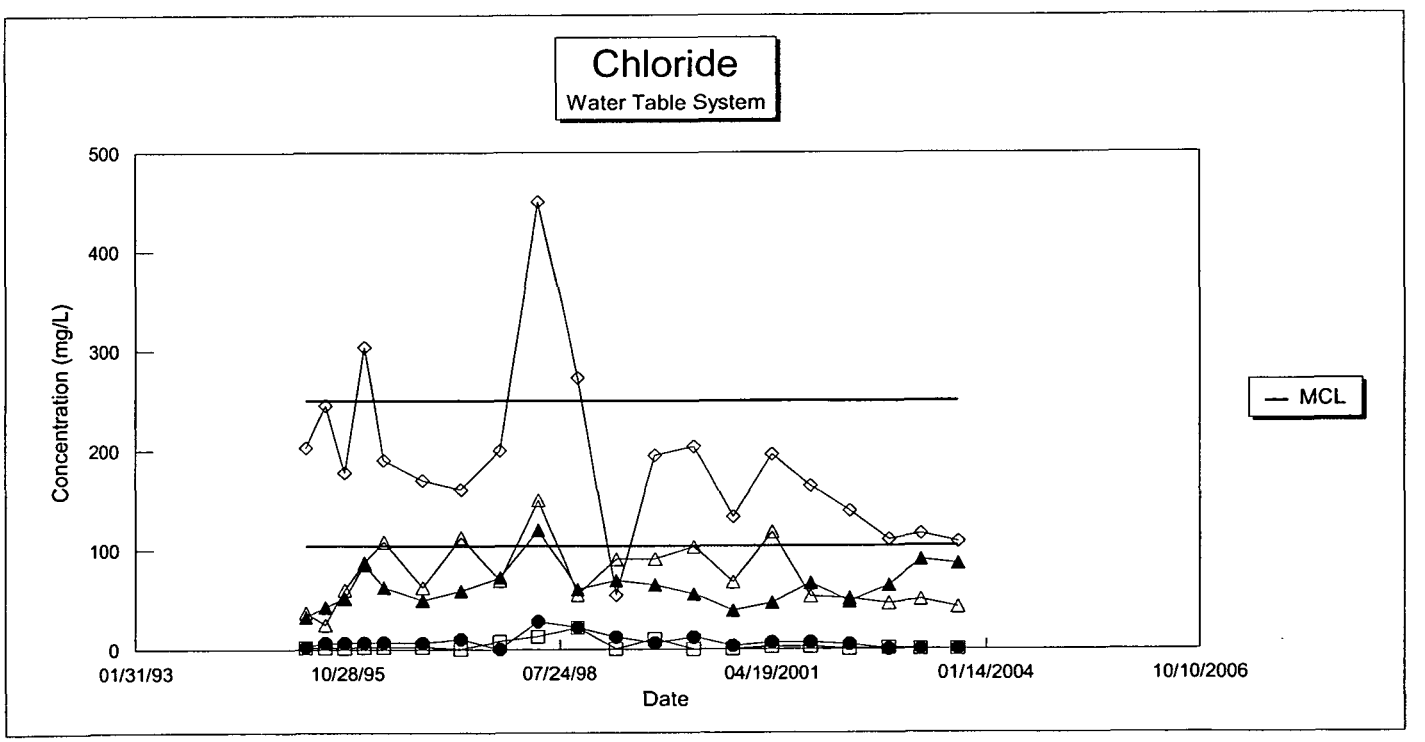
GROUNDWATER SYSTEM
MUSCATINE C & D LANDFILL
70-SDP-4-78C
CONCENTRATION VERSUS TIME

	PARAMETER	MCL mg/L		Mean + 2STD	U.W.T. MW 6	D.W.T. MW 2	D.W.T. MW 3	D.W.T. MW 4	D.W.T. MW 7
04/15/95	Iron, dissolved		0.3	5.647	0.41	0.25	12.3	0.27	0.11
07/15/95	Iron, dissolved		0.3	5.647	0.02	0.18	7.94	0.05	0.01
10/15/95	Iron, dissolved		0.3	5.647	0.21	0.54	7.31	0.25	0.29
01/15/96	Iron, dissolved		0.3	5.647	0.74	0.59	6.41	0.06	0.81
04/15/96	Iron, dissolved		0.3	5.647	0.33	0.12	10.05	0.3	0.76
10/15/96	Iron, dissolved		0.3	5.647	0.07	1.16	6.33	0.09	0.31
04/15/97	Iron, dissolved		0.3	5.647	0.04	0.69	19.32	0.12	0.15
10/15/97	Iron, dissolved		0.3	5.647	0.015	0.54	15.1	0.015	dry
04/15/98	Iron, dissolved		0.3	5.647	0.1	0.6	21	0.1	0.1
10/15/98	Iron, dissolved		0.3	5.647	10.8	0.661	13.5	0.914	14.9
04/15/99	Iron, dissolved		0.3	5.647	0.0022	0.046	1.19	0.0022	0.0022
10/15/99	Iron, dissolved		0.3	5.647	0.413	0.0022	0.412	0.0022	0.0022
04/15/2000	Iron, dissolved		0.3	5.647	0.0022	0.583	11.7	0.0022	0.0022
10/15/2000	Iron, dissolved		0.3	5.647	0.008	0.653	7.4	0.014	0.0022
04/15/2001	Iron, dissolved		0.3	5.647	0.19	3.5	9.9	0.16	0.11
10/15/2001	Iron, dissolved		0.3	5.647	0.05	0.95	8.4	0.05	0.05
04/15/2002	Iron, dissolved		0.3	5.647	0.06	0.6	0.06	0.06	0.06
10/15/2002	Iron, dissolved		0.3	5.647	0.27	1	5.3	0.16	dry
03/13/2003	Iron, dissolved		0.3	5.647	<0.3	0.511	4.78	0.215	dry
09/04/2003	Iron, dissolved		0.3	5.647	<0.3	0.305	1.06	<0.3	dry
	Mean				0.7628	0.67406	8.4731	0.149189	1.1043
	Standard Deviation (STD)				2.441971	0.714393	5.711631	0.202675	3.570497
	Mean + 2STD				5.646742	2.102846	19.89636	0.554539	8.245294



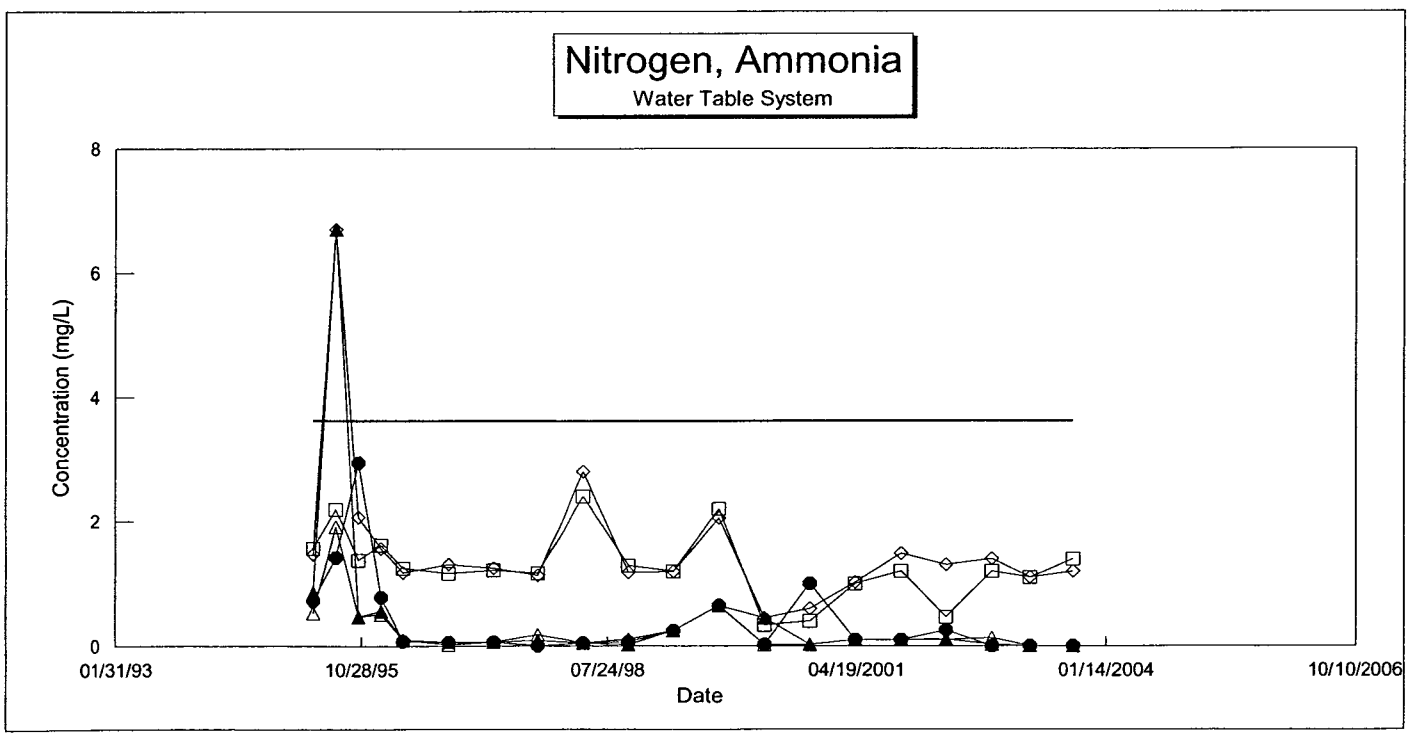
GROUNDWATER SYSTEM
MUSCATINE C & D LANDFILL
70-SDP-4-78C
CONCENTRATION VERSUS TIME

	PARAMETER	MCL mg/L	Mean + 2STD	U.W.T. MW 6	D.W.T. MW 2	D.W.T. MW 3	D.W.T. MW 4	D.W.T. MW 7
04/15/95	Chloride	250	103.052	32.5	1.8	202.5	37	2.4
07/15/95	Chloride	250	103.052	42.6	1.8	245.1	24.8	6.5
10/15/95	Chloride	250	103.052	51.1	1.7	177.5	59.8	6.6
01/15/96	Chloride	250	103.052	85.1	2.3	303.7	87.5	6.8
04/15/96	Chloride	250	103.052	62.5	2.3	190	108.2	7.2
10/15/96	Chloride	250	103.052	49.6	2.5	169.8	62.3	6.4
04/15/97	Chloride	250	103.052	58.9	0.5	160.4	112.3	10.3
10/15/97	Chloride	250	103.052	72	8	200	69	dry
04/15/98	Chloride	250	103.052	120	13	450	150	28
10/15/98	Chloride	250	103.052	60.1	21.8	273	54.6	21.8
04/15/99	Chloride	250	103.052	69.2	0.5	54.3	90.5	12.4
10/15/99	Chloride	250	103.052	64.7	10.5	195	91.1	6.2
04/15/2000	Chloride	250	103.052	55.8	0.5	204	103	12.4
10/15/2000	Chloride	250	103.052	39	0.5	133	67.4	3.37
04/15/2001	Chloride	250	103.052	46.8	2.5	196	118	6.8
10/15/2001	Chloride	250	103.052	66.3	2.5	164	53.1	7
04/15/2002	Chloride	250	103.052	48	0.5	139	51	5
10/15/2002	Chloride	250	103.052	64	1.4	110	46	dry
03/13/2003	Chloride	250	103.052	90	<10	116	50	dry
09/04/2003	Chloride	250	103.052	86	<10	108	42	dry
	Mean			63.21	4.144444	189.565	73.88	9.323125
	Standard Deviation (STD)			19.92119	5.533858	82.44486	31.51115	6.53245
	Mean + 2STD			103.0524	15.21216	354.4547	136.9023	22.38802



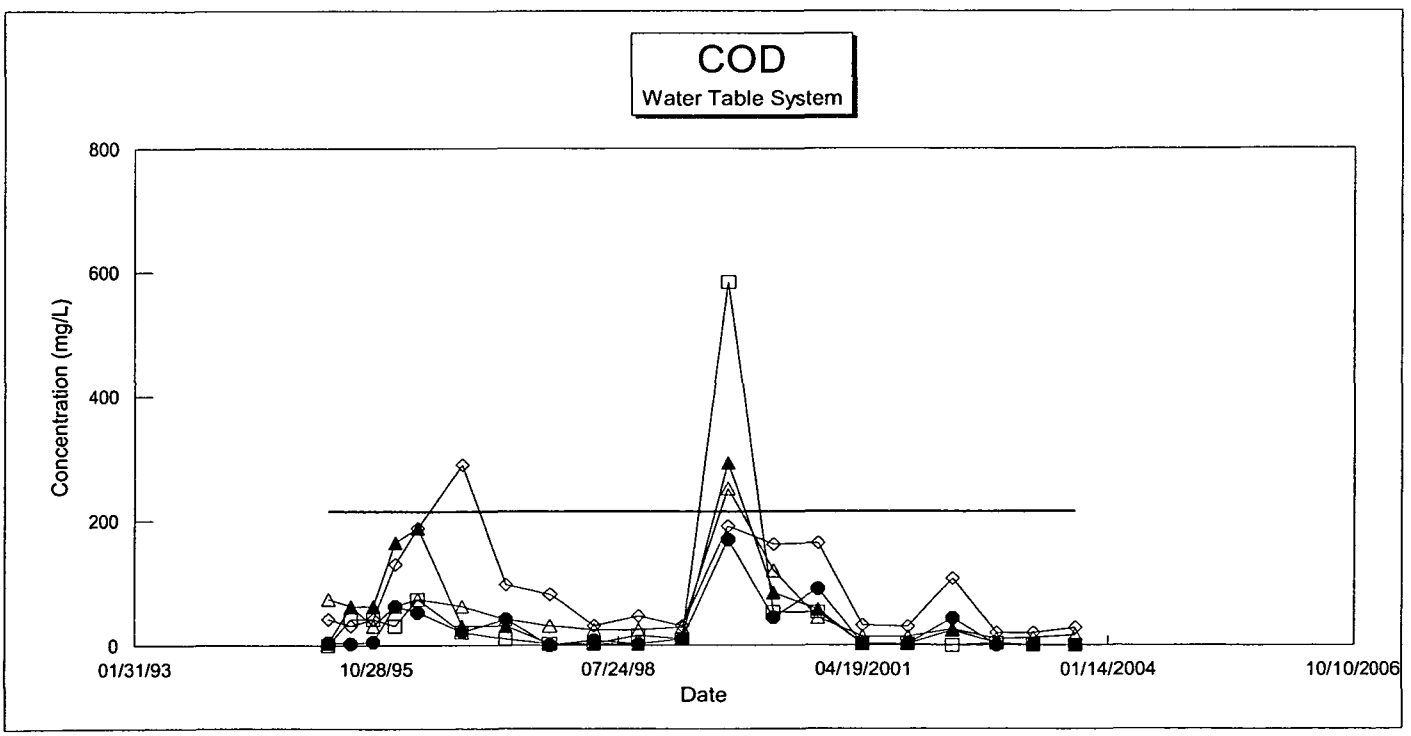
GROUNDWATER SYSTEM
MUSCATINE C & D LANDFILL
70-SDP-4-78C
CONCENTRATION VERSUS TIME

	PARAMETER	MCL mg/L	Mean + 2STD	U.W.T. MW 6	D.W.T. MW 2	D.W.T. MW 3	D.W.T. MW 4	D.W.T. MW 7
04/15/95	Nitrogen, Ammonia	---	3.596	0.86	1.56	1.47	0.53	0.72
07/15/95	Nitrogen, Ammonia	---	3.596	6.7	2.19	6.7	1.91	1.42
10/15/95	Nitrogen, Ammonia	---	3.596	0.47	1.38	2.06	0.47	2.94
01/15/96	Nitrogen, Ammonia	---	3.596	0.56	1.62	1.56	0.51	0.78
04/15/96	Nitrogen, Ammonia	---	3.596	0.1	1.25	1.18	0.1	0.08
10/15/96	Nitrogen, Ammonia	---	3.596	0.06	1.17	1.31	0.025	0.06
04/15/97	Nitrogen, Ammonia	---	3.596	0.06	1.22	1.25	0.06	0.06
10/15/97	Nitrogen, Ammonia	---	3.596	0.09	1.17	1.13	0.18	dry
04/15/98	Nitrogen, Ammonia	---	3.596	0.05	2.4	2.8	0.05	0.05
10/15/98	Nitrogen, Ammonia	---	3.596	0.025	1.29	1.18	0.108	0.067
04/15/99	Nitrogen, Ammonia	---	3.596	0.25	1.2	1.19	0.25	0.25
10/15/99	Nitrogen, Ammonia	---	3.596	0.65	2.2	2.05	0.65	0.65
04/15/2000	Nitrogen, Ammonia	---	3.596	0.448	0.336	0.448	0.025	0.025
10/15/2000	Nitrogen, Ammonia	---	3.596	0.025	0.4	0.6	0.025	1
04/15/2001	Nitrogen, Ammonia	---	3.596	0.1	1	1.02	0.1	0.1
10/15/2001	Nitrogen, Ammonia	---	3.596	0.1	1.2	1.48	0.1	0.1
04/15/2002	Nitrogen, Ammonia	---	3.596	0.11	0.46	1.3	0.1	0.254
10/15/2002	Nitrogen, Ammonia	---	3.596	0.025	1.2	1.4	0.13	dry
03/13/2003	Nitrogen, Ammonia	---	3.596	<1	1.1	1.1	<1	dry
09/04/2003	Nitrogen, Ammonia	---	3.596	<1	1.4	1.2	<1	dry
	Mean			0.5935	1.2873	1.6214	0.295722	0.53475
	Standard Deviation (STD)			1.501318	0.531177	1.265696	0.436515	0.741713
	Mean + 2STD			3.596137	2.349653	4.152793	1.168751	2.018176



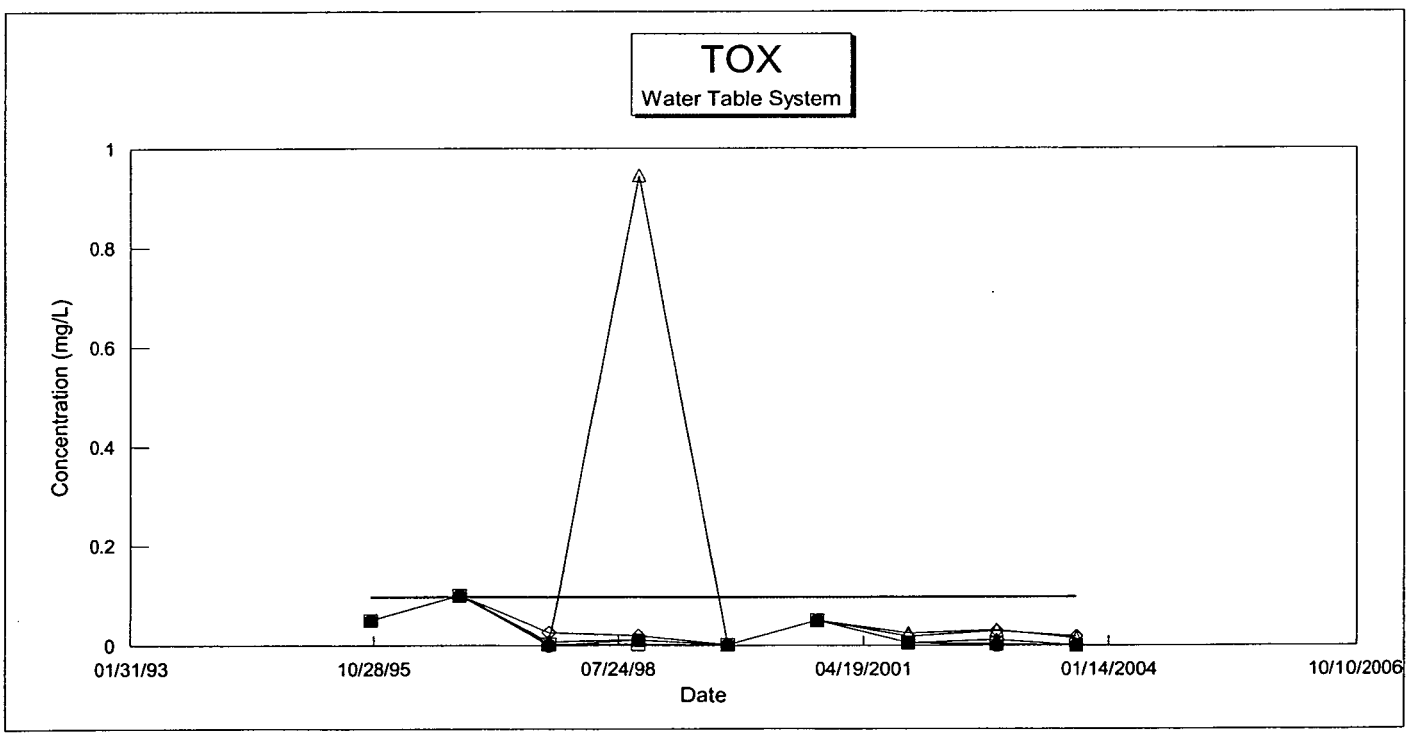
GROUNDWATER SYSTEM
MUSCATINE C & D LANDFILL
70-SDP-4-78C
CONCENTRATION VERSUS TIME

	PARAMETER	MCL mg/L	Mean + 2STD	U.W.T. MW 6	D.W.T. MW 2	D.W.T. MW 3	D.W.T. MW 4	D.W.T. MW 7
04/15/95	COD	---	213.881	2.9	0.05	42	74	4.3
07/15/95	COD	---	213.881	62	42	31	63	2.8
10/15/95	COD	---	213.881	63	42	42	31	5.1
01/15/96	COD	---	213.881	165	31	130	63	63
04/15/96	COD	---	213.881	188	74	188	74	53
10/15/96	COD	---	213.881	31	21	290	63	21
04/15/97	COD	---	213.881	31	10	97	42	42
10/15/97	COD	---	213.881	2.5	2.5	82	31	dry
04/15/98	COD	---	213.881	2.5	2.5	31	25	8
10/15/98	COD	---	213.881	2	16	47	25	2
04/15/99	COD	---	213.881	10	10	31	29	10
10/15/99	COD	---	213.881	293	585	191	252	170
04/15/2000	COD	---	213.881	84.1	53.1	162	120	44.3
10/15/2000	COD	---	213.881	57.5	53.1	164	44.3	90.7
04/15/2001	COD	---	213.881	2.5	2.5	32	14	2.5
10/15/2001	COD	---	213.881	2.5	2.5	30	14	2.5
04/15/2002	COD	---	213.881	23.8	NT	107	25.9	43.4
10/15/2002	COD	---	213.881	3	3	20	10	dry
03/13/2003	COD	---	213.881	<10	<10	20	12	dry
09/04/2003	COD	---	213.881	<10	<10	28	16	dry
	Mean			57.01667	55.89706	88.25	51.41	35.2875
	Standard Deviation (STD)			78.4321	134.086	74.1329	53.48156	43.49214
	Mean + 2STD			213.8809	324.0691	236.5158	158.3731	122.2718



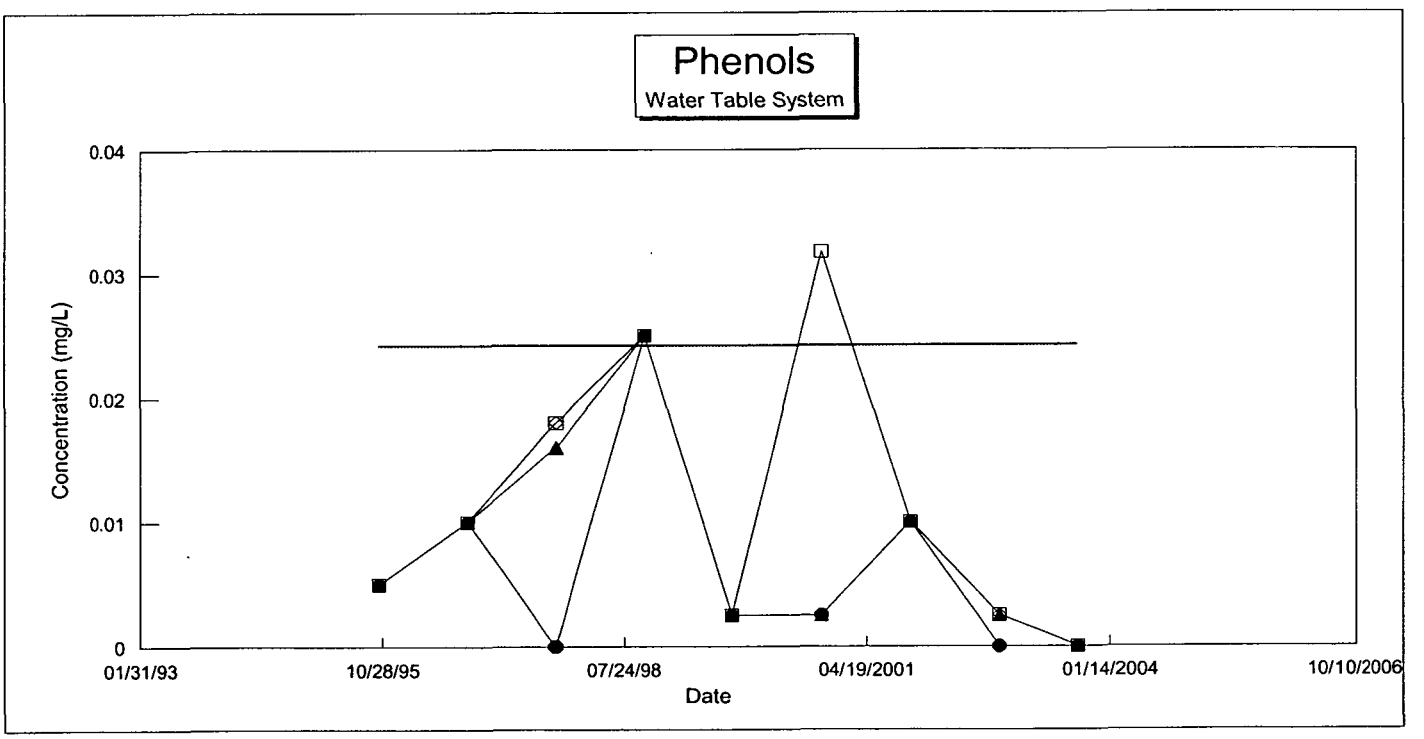
GROUNDWATER SYSTEM
MUSCATINE C & D LANDFILL
70-SDP-4-78C
CONCENTRATION VERSUS TIME

	PARAMETER	MCL mg/L	Mean + 2STD	U.W.T. MW 6	D.W.T. MW 2	D.W.T. MW 3	D.W.T. MW 4	D.W.T. MW 7
10/15/95	TOX	---	0.094	0.05	0.05	0.05	0.05	0.05
10/15/96	TOX	---	0.094	0.1	0.1	0.1	0.1	0.1
10/15/97	TOX	---	0.094	0.007	0.0025	0.026	0.007	0.0001
10/15/98	TOX	---	0.094	0.011	0.0025	0.019	0.945	0.01
10/15/99	TOX	---	0.094	0.001	0.001	0.001	0.001	0.001
10/15/2000	TOX	---	0.094	0.05	0.05	0.05	0.05	0.05
10/15/2001	TOX	---	0.094	0.005	0.005	0.018	0.024	0.005
10/15/2002	TOX	---	0.094	0.011	0.0025	0.029	0.031	dry
09/04/2003	TOX	---	0.094	<0.01	<0.01	0.018	0.014	dry
	Mean			0.029375	0.026688	0.034556	0.135778	0.030871
	Standard Deviation (STD)			0.03243	0.034181	0.027447	0.287496	0.034754
	Mean + 2STD			0.094236	0.09505	0.08945	0.710771	0.100379



GROUNDWATER SYSTEM
MUSCATINE C & D LANDFILL
70-SDP-4-78C
CONCENTRATION VERSUS TIME

	PARAMETER	MCL mg/L	Mean + 2STD	U.W.T. MW 6	D.W.T. MW 2	D.W.T. MW 3	D.W.T. MW 4	D.W.T. MW 7
10/15/95	Phenols	---	0.024	0.005	0.005	0.005	0.005	0.005
10/15/96	Phenols	---	0.024	0.01	0.01	0.01	0.01	0.01
10/15/97	Phenols	---	0.024	0.016	0.018	0.018	0.016	dry
10/15/98	Phenols	---	0.024	0.025	0.025	0.025	0.025	0.025
10/15/99	Phenols	---	0.024	0.0025	0.0025	0.0025	0.0025	0.0025
10/15/2000	Phenols	---	0.024	0.0025	0.0318	0.0025	0.0025	0.0025
10/15/2001	Phenols	---	0.024	0.01	0.01	0.01	0.01	0.01
10/15/2002	Phenols	---	0.024	0.0025	0.0025	0.0025	0.0025	dry
09/04/2003	Phenols	---	0.024	<0.1	<0.1	<0.1	<0.1	dry
	Mean			0.009188	0.0131	0.009438	0.009188	0.009167
	Standard Deviation (STD)			0.007496	0.010154	0.007748	0.007496	0.007728
	Mean + 2STD			0.024179	0.033408	0.024933	0.024179	0.024623



ATTACHMENT C
Water Elevation Data

Water Level Data
Muscatine C&D Landfill

Well/TOC	MW-1	640.42	MW-2	640.86	MW-3	640.36	MW-4	693.22	MW-5	716.8	MW-6	716.63	MW-7	716.65	PZ-8	692.99
Depth of Well		67.09		42.6		22.06		24.43		76.5		48.98		22.25		46

Date	Water Depth	Water Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation
11/04/93	NT	NT	6.24	634.62	7.08	633.28	16.44	676.78	70.75	646.05	39.38	677.25	16.35	700.3	42.05	650.94
11/23/93	5.60	634.82	6.05	634.81	7.24	633.12	16.94	676.28	57.04	659.76	48.94	667.69	16.72	699.93	42.30	650.69
12/09/93	5.64	634.78	6.10	634.76	7.53	632.83	17.20	676.02	53.54	663.26	40.76	675.87	17.15	699.5	NT	NT
12/16/93	6.22	634.2	7.71	633.15	7.62	632.74	17.49	675.73	52.57	664.23	41.05	675.58	17.70	698.95	NT	NT
01/20/94	5.97	634.45	6.40	634.46	8.46	631.9	18.05	675.17	50.95	665.85	52.57	664.06	18.50	698.15	42.26	650.73
10/28/99	6.80	633.62	7.20	633.66	10.10	630.26	18.60	674.62	45.95	670.85	41.95	674.68	19.70	696.95	NT	NT
09/30/2002	7.10	633.32	7.58	633.28	10.68	629.68	18.83	674.39	44.03	672.77	41.95	674.68	20.63	696.02	34.69	658.3
03/18/2003	6.70	633.72	7.15	633.71	9.20	631.16	19.08	674.14	44.80	672	42.55	674.08	21.15	695.5	34.40	658.59
09/04/2003	7.85	632.57	8.40	632.46	11.80	628.56	20.10	673.12	45.45	671.35	43.35	673.28	21.95	694.7	36.00	656.99
	-		-		-		-		-		-		-		-	
Average	5.76		6.98		8.86		18.08		51.68		43.61		18.87		25.74	
Std. Dev.	2.15		0.78		1.59		1.11		7.99		4.05		1.94		18.44	
	37.30%		11.21%		18.00%		6.12%		15.46%		9.30%		10.29%		71.64%	
Maximum	7.85		8.40		11.80		20.10		70.75		52.57		21.95		42.30	
Minimum	0.00		6.05		7.08		16.44		44.03		39.38		16.35		0.00	

P.N. 6008

ATTACHMENT D
Groundwater Contour Map

ATTACHMENT E
Closure Permit & Amendments

Fields of Opportunities

STATE OF IOWA

THOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

LSW ✓
DJL ✓
Binder ✓

July 2, 2003

Lavene Payne, Solid Waste Manager
City of Muscatine
1000 S Houser
Muscatine, IA 52761

RE: City of Muscatine C & D Landfill (CLOSED)
Permit No. 70-SDP-04-78C
Amendment #3

Dear Mr. Payne:

Enclosed is Amendment #3 to the permit issued on December 29, 1994, for the City of Muscatine C & D Landfill (CLOSED). The amendment and approved plans must be kept with the permit and the approved plans at the sanitary disposal project in accordance with solid waste rule 567 IAC 114.26(2)"c". Please review this amendment with your operators, as they must become familiar with it.

In accordance with the February 20, 2003 request from FOX Engineering Associates, Inc., the enclosed amendment authorizes the permit holder to move the schedule of monitoring events one month earlier by **1)** Allowing the semiannual sampling to be conducted in March and September of each year; **2)** Allowing the annual sampling to be conducted in September of each year; **and 3)** Allowing the water level measurements to be conducted in March and September of each year.

Note that the amendment may contain conditions that require a response or action by you, which if not properly complied with, may prompt enforcement action by this department.

If you have any questions, you may contact me at 515/281-8968.

Sincerely,

Jeff Simmons

Jeff Simmons
Environmental Engineer
Energy & Waste Management Bureau

JNS\JNS\J:MuscatineC&D94amd3X.doc

IOWA DEPARTMENT OF NATURAL RESOURCES
AMENDMENT #3

Issued by: Nina M. Koger
Nina M. Koger
Environmental Services Division

For: the Director

Date Issued: July 2, 2003

Permit number 70-SDP-04-78C, issued on December 29, 1994, for the City of Muscatine C&D Landfill (CLOSED) is hereby amended by the following:

In accordance with the variance approval of September 15, 1998, the permit holder is authorized to reduce the frequency of groundwater level measurements from monthly, as required by current subrule 567 IAC 114.26(4)"b", to semiannually.

Accordingly, in accordance with the February 20, 2003 request from FOX Engineering Associates, Inc., the permit holder is authorized to conduct water quality sampling and water level measurements in March and September rather than April and October.

Replace Special Provision #5b and #5g with the following:

#5b. Quarterly sampling of the approved monitoring points has been completed. Continued semiannual sampling shall take place in March and September of each year for the parameters listed in 567 IAC 114.26(4)"e". Routine annual testing for the parameters listed in 567 IAC 114.26(4)"f" shall be conducted during September of each year.

The elevation of water in each monitoring well shall be measured and recorded on a semiannual basis in March and September.

#5g. An Annual Water Quality Report (AWQR) summarizing the effects the facility is having on groundwater and surface water quality shall be submitted to the Department's Main and local Field offices by November 30 each year. This report shall be prepared in accordance with 567 IAC 114.26(8)"d" by a Professional Engineer licensed in the State of Iowa. The AWQR shall include the results of the semiannual groundwater measurements and the routine semiannual and annual groundwater quality analyses conducted at the approved monitoring points. By means of a variance granted on September 15, 1998, groundwater measurements may be taken on a semiannual basis.

NMK\JNS\J: MuscatineC&D94amd3.doc

Special MR, testing/reporting-CBO   10-SDP-04-18

FOX engineering

February 20, 2003

Nina M. Koger
Lead Engineer
IDNR – Solid Waste Section
502 E. 9th St.
Des Moines, Iowa 50319

2003 FEB 28 A 9:29
DEPT. OF NATURAL RESOURCES

Re: **Request for Permit Amendment**
City of Muscatine C&D Landfill - *Closed*
IDNR #70-SDP-4-*78C*

Dear Ms. Koger:

Please accept this letter, on behalf of the City of Muscatine, as a formal request for a Permit Amendment to Closure Permit 70-SDP-4-78C, dated December 29, 1994.

We are requesting that the semi-annual sampling episodes required by Special Provision 5.b. be scheduled to occur in March and September of each year, rather than in April and October. Likewise, we are requesting that the annual sampling episode be required to occur in September of each year, rather than October.

Additionally, we request that the semi-annual groundwater level measurements specified by Permit Amendment 1.1 also be scheduled to occur in March and September of each year.

A March/September sampling and water elevation measurement schedule at this site will allow these activities to be conducted concurrently with the sampling events at the operating Muscatine County Sanitary Landfill. Such a schedule will greatly benefit the City of Muscatine, promoting efficiency and an economy of scale when a single contractor can perform required services during a single mobilization. Cost savings should be realized by the City of Muscatine through issuance of this Permit Amendment.

No water quality issues have been identified at the site during previous sampling and reporting efforts by the City. The required sampling is limited to the routine parameters listed in subrule 113.26(4)e and 113.26(4)f.

We appreciate your consideration of this matter and seek your timely response to this request. If you have any questions, please contact me directly (515/233-0000). Thank you in advance for your prompt response.

Sincerely,
FOX Engineering Associates, Inc.

Todd Whipple

Todd Whipple, CPG
Project Manager

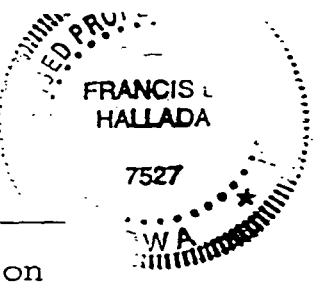
cc: Lavene Payne, Muscatine

Water | Wastewater | Solid Waste | Air | Land

1601 Golden Aspen Dr.
Suite 103
Ames, Iowa 50010
1.515.233.0000
1.800.433.3469
Fax 1.515.233.0103
www.foxeng.com
info@foxeng.com

IOWA DEPARTMENT OF NATURAL RESOURCES

AMENDMENT #1



Issued by: _____

F. Hallada, P.E.
Environmental Protection Division

For: the Director

Date Issued: September 15, 1998

Permit number 70-SDP-4-78C for the Muscatine C&D Sanitary Landfill is hereby amended by the following:

1. In accordance with the variance approval of September 15, 1998, the permit holder is authorized to reduce the frequency of groundwater level measurements from monthly, as required by subrule 103.2(4)b IAC, to semiannually. The measurements shall be taken in ~~April~~ MARCH and ~~October~~ SEPTEMBER of each year, with the results submitted in the corresponding semiannual monitoring reports.

2. In accordance with the variance approval of September 15, 1998, the permit holder is authorized to cease methane gas monitoring and annual reporting, as required by IAC Subrule 103.2(15). However, in the event that methane gas is found to be present at the site, gas monitoring shall be immediately implemented.

3. The permit holder is authorized to reduce the frequency of routine site inspections from monthly, as required by Special Provision #6 of the permit, to semiannually. The inspections shall be conducted in April and October of each year, with the results submitted in the corresponding semiannual engineering inspection reports.

IDSL

RECEIVED JAN 2 4 2002

Fields of Opportunities

STATE OF IOWA

THOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

January 18, 2002

Robert McDonald, P.E.
Assistant City Engineer
Department of Public Works
1459 Washington Street
Muscatine, IA 52761-5042

SUBJECT: City of Muscatine C&D Landfill
#70-SDP-4-78C

Dear Mr. McDonald:

This letter constitutes Amendment #2 to the permit issued December 29, 1994 for the City of Muscatine C&D Landfill. The amendment and approved plans must be kept with the permit and the approved plans at the sanitary disposal project in accordance with solid waste rule 103.2(2)'c', IAC. Please review this amendment with your operators, as they must become familiar with it.

The amendment adds the following as a Special Provision to your permit:

The Emergency Response and Remedial Action Plan (ERRAP) prepared by Fox Engineering Associates, Inc. that was received on December 28, 2001 is in compliance with 567 IAC 102.16 and is hereby approved. An updated ERRAP shall be submitted at the time of any significant changes in facility closure operations that require modification of the currently approved ERRAP.

If you have any questions regarding this amendment, please contact Nina M. Koger at (515) 281-8986.

Sincerely,

for Lavoy Haage
Supervisor
Solid Waste Section

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

September 15, 1998

Robert McDonald, P.E.
Assistant City Engineer
Department of Public Works
1459 Washington Street
Muscatine, IA 52761-5042

SUBJECT: Muscatine County Sanitary Landfill
#70-SDP-4-78C C+D landfill

Dear Mr. McDonald:

Enclosed is Amendment #1 to the permit issued December 29, 1994 for the Muscatine County Sanitary Landfill. The amendment must be kept with the permit and the approved plans at the sanitary disposal project in accordance with solid waste rule 103.2(2)'c', IAC. Please review this amendment with your operators, as they must become familiar with it.

The enclosed amendment (1) authorizes a reduction in the frequency of water level measurements from a monthly basis to a semiannual basis; (2) authorizes the permit holder to cease methane gas monitoring and annual reporting; and (3) authorizes a reduction in the frequency of routine site inspections from a monthly basis to a semiannual basis.

Please note that the permit contains special provisions that may require a response or action by you which, if not properly complied with, may prompt enforcement action.

If you have any questions regarding this amendment, please contact Nina M. Koger at (515) 281-8986.

Sincerely,

Lavoy Haage

Lavoy Haage
Supervisor
Solid Waste Section

LH:nmf

ATTACHMENT

cc: Field Office 6

N. Koger, IDNR

F. Hallada, IDNR

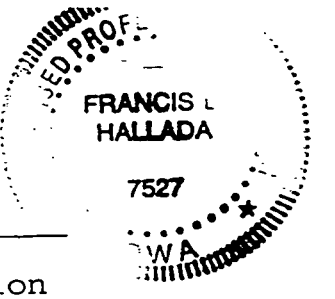
A.J. Johnson, City Administrator
City Hall
Muscatine, IA 52761

Lavene Payne, Solid Waste Manager
Public Works Bldg.
1459 Washington Street
Muscatine, IA 52761

Fox Engineering
1531 Airport Road
Ames, IA 50010

IOWA DEPARTMENT OF NATURAL RESOURCES

AMENDMENT #1



Issued by: _____

F. Hallada, P.E.
Environmental Protection Division

For: the Director

Date Issued: September 15, 1998

Permit number 70-SDP-4-78C for the Muscatine C&D Sanitary Landfill is hereby amended by the following:

1. In accordance with the variance approval of September 15, 1998, the permit holder is authorized to reduce the frequency of groundwater level measurements from monthly, as required by subrule 103.2(4)b IAC, to semiannually. The measurements shall be taken in April and October of each year, with the results submitted in the corresponding semiannual monitoring reports.

2. In accordance with the variance approval of September 15, 1998, the permit holder is authorized to cease methane gas monitoring and annual reporting, as required by IAC Subrule 103.2(15). However, in the event that methane gas is found to be present at the site, gas monitoring shall be immediately implemented.

3. The permit holder is authorized to reduce the frequency of routine site inspections from monthly, as required by Special Provision #6 of the permit, to semiannually. The inspections shall be conducted in April and October of each year, with the results submitted in the corresponding semiannual engineering inspection reports.

STATE OF IOWA

70-SDP-4-78C
PWA File

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

December 29, 1994

Lavene Payne, Solid Waste Manager
Department of Public Works
1459 Washington Street
Muscatine, IA 52761-5042

Re: City of Muscatine C&D Landfill
#70-SDP-4-78C

Dear Mr. Payne:

Enclosed is the closure permit for the City of Muscatine Construction and Demolition Sanitary Landfill. The permit and the approved plans must be kept on file for post closure use and reference. Please review the closure permit and plans with your staff, as they must become familiar with them.

Please note that the permit contains special provisions that may require a response or action by you which, if not properly complied with, may prompt enforcement action.

The permit is authorized continued use of the area as a construction rubble fill site.

If you have any questions regarding this permit, please contact Nina M. Koger at (515) 281-8986.

Sincerely,

Lavoy Haage

Lavoy Haage
Supervisor
Solid Waste Section

LH:nmf

ATTACHMENT

cc: Field Office 6

N. Koger, IDNR

F. Hallada, IDNR

A.J. Johnson, City Administrator
City Hall
Muscatine, IA 52761

Mr. Robert McDonald, P.E.
Public Works Bldg.
1459 Washington Street
Muscatine, IA 52761

Jim Mikolaitis, P.E.
GES, Inc.
P.O. Box 9007
Cedar Rapids, IA 52409-9007

IOWA DEPARTMENT OF NATURAL RESOURCES
SANITARY DISPOSAL PROJECT PERMIT

I. **Permit Number:** 70-SDP-4-78C

II. **Permitted Agency:** City of Muscatine

III. **Project Location:** Part of the NE 1/4, Sec. 3, T76N, R2W, 3 Acres, Muscatine County, Iowa

IV. **Responsible Official**

Name: Lavene Payne, Solid Waste Manager
Address: Department of Public Works
1459 Washington Street
Muscatine, IA 52761-5042
Phone: 319/263-8933

V. **Registered Design Engineer**

Name: Jim Mikolaitis, P.E.
Address: Howard R. Green Company
P.O. Box 9007
Cedar Rapids, IA 52409-9007
Phone: 319/395-0578

Registration Number: 11949

VI. **Date Permit Issued:** December 29, 1994

VII. **Permit Expiration Date:** December 29, 2024

VIII. **Issued by:** _____
Environmental Protection Division
for the Director

IX. **General Provisions**

The above named permitted agency is hereby authorized to close the sanitary landfill at the described location in conformance with Chapter 455B of the Code, the rules pursuant thereto existing the time of issuance, and any subsequent new rules which may be duly adopted, and any provisions contained in Section X of this permit.

The facility shall be closed according to the engineering plans and specifications approved by the Department of Natural Resources and these shall become a part of this permit. Any modifications or deviations from the engineering plans and specifications must have prior approval by the Department and an amendment to this permit issued.

The issuance of this permit in no way relieves the applicant of the responsibility for complying with all other local, state, and federal statutes, ordinances, and rules or other requirements applicable to the closure and maintenance of this closed sanitary landfill.

No legal or financial responsibility arising from the closure and post closure of the approved project shall attach to the state of Iowa or the Department of Natural Resources due to the issuance of this permit.

If title to this project is transferred, the new owner must apply to the Department for a transfer of this permit within thirty days of the date of title transfer. This transfer is void sixty days after the date of title conveyance unless the Department has transferred the permit.

This facility shall be surveyed as necessary and inspected as described in the special provisions of this permit. Semiannual reports shall be prepared containing a brief report describing the site's conformance and nonconformance with the permit and the approved plans and specifications during the inspections. These reports shall be submitted by May 1 and November 1 each year to both the Field and Main offices of the Department. The Department shall be notified if any inspection reveals any nonconformance with the permit and approved plans and specifications.

Failure to comply with Chapter 455B of the Code, or any rule of order promulgated pursuant thereto, or any or all provisions of this permit may result in a civil penalty of up to $5000 for each day of violation, pursuant to Section 455B.307 of the Code.

X. Special Provisions

1. The thirty-year post closure period for this facility begins on the date of issuance of this Closure Permit.

2. This site shall be closed and maintained in accordance with the approved Construction and Demolition Debris/Construction Rubble Landfill Closure and Post Closure Plan (C/PCP), dated May 2, 1994, and Plans dated March 19, 1994, as submitted by Green Environmental Services, Inc. (GES).

3. Issuance of this closure permit prohibits any additional regulated waste disposal, recycling, composting, and other related landfill activities which are subject to permit approval. However, the permit holder is

authorized continued use of the closed landfill for construction rubble fill, in accordance with the approved documents and permit conditions.

4. The permit holder shall submit a closure compliance report certified by a professional engineer registered in the State of Iowa upon completion of the final cap placement. The report shall certify that the site closure has been implemented in compliance with the rules, the Closure and Post Closure Plan, and the permit. The following information must be included in the report:

   a. As built plans showing changes from approved design plans, including the grading and seeding of borrow areas.

   b. A copy of the notation filed with the county recorder showing, for the purposes of title abstract, the existence of a landfill on the property, the types of wastes disposed of and dates of landfill use.

5. This site shall be monitored for water quality in accordance with the approved Hydrogeologic Investigation Report and Hydrologic Monitoring System Plan (HMSP), dated February 28, 1994, as submitted by GES.

   a. The HMSP shall include groundwater monitoring points MW-2, MW-3, MW-4, MW-6, and MW-7

      In addition, monitoring points MW-1, MW-5, and PZ-8 shall be retained as water level measuring points.

   b. First year quarterly sampling shall begin in April 1995. Subsequent quarterly sampling shall continue in July and October 1995, and January 1996 for analysis of the parameters listed in subrule 103.2(4)d and e IAC. Continued semiannual sampling shall take place in April and October of each year for the parameters listed in subrule 103.2(4)e IAC, beginning in April 1996. Routine annual testing for the parameters listed in subrule 103.2(4)f shall be conducted during October of each year, beginning in October 1995.

   c. Samples collected for dissolved metals analysis shall be **field filtered, preserved**, and promptly transferred to a certified laboratory.

   d. The Method Detection Limit (MDL) for the test parameters shall not exceed action levels as defined under IAC Chapter 133. If the action levels cannot be feasibly achieved using procedures described in

IAC Subrule 103.2(5), then the MDL shall not exceed the lowest feasible level.

e. If laboratory test results exceed the upgradient mean plus two standard deviations or the Maximum Contaminant Level (MCL) for any parameter, the Department shall be notified within 30 days of receipt of the analytical results.

f. Results of all analysis and the associated sampling forms shall be submitted to both the field and main offices of this department within 45 days of the sample collection.

g. An annual report summarizing the effects the facility is having on groundwater and surface water quality shall be submitted to the Department by November 30 of each year. This report shall be prepared in accordance with IAC Subrule 103.2(8)d by a professional engineer registered in the state of Iowa. This report shall include the results of groundwater level measurements conducted in the monitoring wells.

6. This site shall be inspected monthly for the first year, or more frequently depending on weather conditions. The frequency of routine inspections may be decreased, after the first year, but no less frequent than semiannually, if the permit holder provides justification that monthly inspections are no longer necessary to ensure proper maintenance of the site. Summarize all inspection data in the semiannual report defined in the General Provisions.

7. All diversion and drainage systems must be maintained to the approved specifications to prevent run-on and runoff erosion, or other damage to the final cover. These diversion and drainage structures must be designed to meet a 25-year, 24 hour rainfall event.

8. The vegetative cover shall be reseeded as necessary to maintain good vegetative growth. Any invading vegetation whose root system could damage the compacted soil layer shall be removed or destroyed immediately.

9. The integrity and effectiveness of the final cover must be maintained by making repairs as necessary to correct the effects of settling, subsidence, erosion, or other events. If damage to the final cover compacted soil layer occurs, repairs shall be made to correct the damage and return it to original specifications.

10. The permit holder shall quarterly monitor and annually report site methane concentrations in accordance with subrule 103.2(15) IAC after May 18, 1994. Specific

actions, as defined in the rules, shall be taken in the event of methane gas level limit exceedances The annual report summarizing the methane gas monitoring results and any action taken resulting from gas levels exceeding the specified limits during the previous 12 months shall be submitted by November 30 of each year.

11. The permit holder is conditionally exempt from providing and implementing a leachate control system plan. Continued exemption is subject to compliance with water quality standards, statistical limits per IAC subrule 103.2(6) through 103.2(8), and the control of leachate at the site. In the event that these conditions are violated, the permit holder shall be required to submit a groundwater quality assessment plan in accordance with IAC subrule 103.2(9).

12. The permit holder is exempt from Financial Assurance requirements, as provided in IAC Chapter 111, since municipal solid waste has not been disposed of at this facility.